SYSTEM FOR IDENTIFYING TRANSPORTED GOODS

Background of the Invention

[0001] This invention relates to the identification of goods to be transported from one location to another location within a controlled environment. In particular, this invention relates to method and apparatus for identifying the goods to be transported so as to thereby establish parameters for controlling the environment.

[0002] Container units are used to transport goods by plane, rail, ship, or truck. Such container units may include an environmental control unit that controls the environment of the goods in transit. These control units are typically programmed in advance so as to be able to at least establish an appropriate temperature within the container unit. Depending on the level of sophistication of these control units, they may also be able to control humidity, percent carbon dioxide, and other environmental parameters.

[0003] It is to be appreciated that different goods will require different environmental parameters. These environmental parameters are typically entered into the control unit either manually or automatically based on an identification of the good. The manual method often requires identifying a control parameter and then selecting or typing in the value for the identified parameter. For instance, one would either type in a value or select a value for the temperature setting to be used by the control unit. The automatic entry method often involves selecting a type of goods from a display screen associated with a data entry device for the control unit. The goods are typically highlighted and selected using various selection keys on the data entry device. For instance, the display might include the word "apples" that could be highlighted and selected using the selection keys.

[0004] Both the manual and automatic data entry methods are prone to error. In this regard, a person performing the data entry operation may inadvertently enter the

wrong value for the control parameter or the wrong type of goods. For example, the person might select or type in the wrong temperature setting or select a fruit other than apples from the display screen even though the goods to be transported are apples needing at least a particular controlled temperature. What is needed is a data entry system that does not rely on a human to perform the data entry task.

Summary of the Invention

[0005] The present invention provides a system for automatically identifying goods to be transported within a container having an environmental control unit. The system includes a sensor for sensing a code associated with the goods. The code is preferably a bar code for the goods. The code may be affixed to a box or other containment means for the goods. The code may alternatively appear apart from the containment means such as on the documentation associated with the goods. In any event, the code is scanned by the sensor. A processor associated with the sensor uses the scanned code to select control parameters for the environmental control unit. This is preferably accomplished by selecting the appropriate control parameters from a lookup table of stored control parameter values associated with possible scanned codes.

[0006] In a preferred embodiment of the invention, communication means is also provided to indicate whether the sensed code was recognized by the system. In the event that the sensed code is not recognized, the processor is operative to permit the addition of the sensed code and associated control parameters to the look up table.

Brief Description of the Drawings

[0008] For a fuller understanding of the present invention, reference should now be made to the following detailed description thereof taken in conjunction with the accompanying drawings wherein:

[0009] Figure 1 is a perspective view of a truck trailer having an environmental control unit affixed to the front of the trailer;

[0010] Figure 2 is a schematic view of the system for identifying goods to be transported by the trailer of Figure 1;

[0011] Figure 3 is a diagram of the process implemented by a processor within the system of Figure 2 to identify and confirm the goods to be transported by the trailer of Figure 1;

[0012] Figure 4 illustrates a look up table used by the processor within the system of Figure 2 to associate a particular set of control parameters for the identified goods to be transported; and

[0013] Figure 5 is a diagram of a routine used by the processor within the system of Figure 2 to add another identification of goods and associated control parameters to the look up table of Figure 4.

Description of the Preferred Embodiment

[0015] Referring to Figure 1, a truck trailer 10 having an environmental control unit 12 affixed to the front of the container portion 14 of the trailer is illustrated. The environmental control unit 12 is preferably a vapor compression unit that adds or extracts heat and moisture from air being circulated to and from the container portion of the trailer. The container portion 14 is to be loaded with goods in boxes such as a box 16. In the preferred embodiment, the box 16 includes a code 18 affixed thereto. The code 18 is preferably read by a handheld sensor 20 although a stationary sensor could be used as well. The code is preferably a barcode and the sensor is preferably a barcode scanner. It is however to be appreciated that other codes and sensors could be used. For example, a magnetically stored code could be sensed by a magnetic head. It is furthermore to be appreciated that the code need not be affixed to the box

or other containment means for the goods. In this regard, the code could appear on documentation associated with the goods. An example of such documentation would be a shipping document accompanying the boxes containing the goods. It is finally to be appreciated that the goods need not be transported by a truck trailer. In this regard, any form of transportation system employing an environmental control unit for controlling the environment of the transported goods could employ a code and sensor such as discussed above.

[0016] Referring to the environmental control unit 12, it is to be noted that a data entry device 22 is located behind a hinged door 24 on this unit. The data entry device preferably includes an input that receives an electrical signal from the sensor 20 representing the read or sensed code 18. The input may allow cabling 26 associated with the sensor to be plugged and unplugged from the data entry device. On the other hand, the cabling 26 may be permanently affixed to the input. The sensor 20 also may or may not be permanently affixed to the cabling 26. Finally, the sensor 20 may have a wireless communication capability with the data entry device that would not require the cabling 26

[0017] Referring to Figure 2, the data entry device 22 is seen to include an input/output circuit (I/O circuit) 28 that receives the electrical signal representing the read or sensed code 18. As noted previously, the input/output circuit may receive this signal via wired transmission through the cabling 26 or it may receive this signal via a wireless communication path. In the latter case, the I/O circuit would need to have a wireless receiver either embedded therein or associated therewith. In any event, the received signal is fed to a processor 30 which attempts to associate the received signal with a set of control parameters that will be used to control an environmental control system 32. The manner in which this is accomplished will be explained in detail hereinafter. As will also be explained in detail hereinafter, the processor 30 is operative to transmit a communication to a display 34 which will either confirm or not confirm that the sensed code has been successfully associated with a set of control parameters. As will still furthermore be explained hereinafter, the processor 30 may include a routine that will allow the code 18 and associated control parameters to be

manually entered into the system in the event that a message is received that the sensed code was not successfully associated with a set of control parameters. This is preferably done using a keypad 36 in association with the display 34. It is finally to be noted that the I/O circuit 28, the environmental control system 32, the display 34, and the keypad 36 could all be connected to the processor 30 via a communication bus instead of the depicted separate connections to the processor. In this latter case, each of these devices would include the appropriate communication protocol capability to communicate with the processor 30.

[0018] Referring to Figure 3, the process implemented by the processor 30 that confirms recognition of a sensed code is illustrated. The depicted process also addresses how an unrecognized code is to be dealt with. The process begins with a step 38 wherein the processor inquires as to whether the sensor has sent a sensed code to the processor. In the event that a sensed code has been transmitted, the processor will proceed to read the code in a step 40. The code may be serially transmitted as a series of pulses or in a binary format. In either case, the processor may need to convert the pulses or binary formatted code to an index value in a step 42. This could be as complex as converting the pulses to a usable numerical format and thereafter converting the format to an index value or as simple as recognizing all or merely portions of the binary formatted code as a usable index. For instance, if the code transmitted to the processor is a series of encoded pulses that were read by the processor in step 40, then the conversion in step 42 would be to an index value expressed in binary or hex decimal or as a base ten number. The resulting index value would be used by the processor in a step 44 to find a set of associated control parameters in a look up table. An example of such a look up table for a base ten numerical index is illustrated in Figure 4. Referring to Figure 4, the numerical index value of ten is associated with control parameter settings or values to be used with apples whereas a numerical index value of eleven is associated with control parameter settings to be used with oranges and a numerical index value of twelve is associated with control parameter settings to be used with fish. The depicted control parameters include temperature setpoint, defrost, fan or air circulation mode, percent carbon dioxide, and percent humidity. It is to be appreciated that there may be more or less

control parameters without departing from the scope of the invention.

[0019] Referring again to Figure 3, the processor asks in a step 46 as to whether the numerical index obtained in step 42 matches any of the numerical indexes in the lookup table of Figure 4. In the event that there is a match, the processor proceeds to a step 48 and sends a confirmation message to the display 34. The processor then proceeds to send the control parameter settings or values to either environmental control software resident within the same processor or directly to the environmental control system 32 which includes its own processor. The processor thereafter exits the process of Figure 3 via exit step 52.

[0020] Referring again to step 46, in the event that there is not a successful match, then the processor proceeds to a step 54 and sends an error message to the display 34. The processor thereafter proceeds to a step 56 and awaits an indication from the keypad 36 as to whether a manual entry of the code and associated control parameter values is to be attempted. The processor will preferably wait a finite period of time for an indication of such from the keypad. In the event that no indication for manual entry is received within this time, the processor will proceed along to exit step 52. If on the other hand, an indication for manual entry is timely received, than the processor will proceed to a manual entry routine in a step 58.

[0021] Referring to Figure 5, the manual entry routine begins with a step 60. Inquiry is made in step 60 as to whether the keypad 36 indicates that a configuration mode is to be entered into. This could be as simple as looking for depression of a single key on the keypad 36 following transmission of the error message to the display in step 54. Assuming that the single key has been depressed, the processor proceeds to request entry of an index value by sending a message to the display 34 in a step 62. The processor thereafter awaits an appropriately typed in entry in a step 64. This may include examining any entry for compliance with specific format requirements before acceptance of the entry. Assuming proper entry, the processor will proceed to a step 66 and request entry of control parameter settings or values. This will preferably include sending individual messages to the display 34 requesting entry of each control

parameter and thereafter examining each entry for compliance with any specific format requirements before acceptance of that entry. The processor will inquire as to whether all entries have been made in a step 68. This may be accomplished by incrementally counting the successful entries of control parameter settings in step 66 and noting when the last successful entry has been made. When all entries have been successfully made, the processor proceeds to a step 70 and stores the index value and associated control parameter settings or values in the look-up table of Figure 4. The processor next sends a confirmation message to the display 34 indicating that the lookup table has been successfully updated.

[0022] Referring to step 58 in Figure 5, the processor will proceed to the exit step 52 following completion of the manual entry routine of Figure 6. It is to be noted that the manual entry routine of Figure 6 will also preferably include a keypad entry that would allow it to proceed immediately to the exit step 52 without completing an entry of an index value and associated control parameter settings.

[0023] It is to be appreciated that a particular embodiment of the invention has been disclosed herein. The embodiment has focused on goods that are to be transported. It will be appreciated by those skilled in the art that the invention would however work equally well in processing sensed codes of goods merely being stored in a stationary container such as a refrigeration unit located in a warehouse or at a retail point of sale. Accordingly, the foregoing description is by way of example only and the invention is to be limited only by the following claims and equivalents thereto.